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Furbearer Winter Track Count Survey of 2001[1]

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Introduction

Predatory furbearers are intelligent, secretive, dispersed, less abundant than herbivores, and often among the least understood of all wildlife species. The Upper Peninsula (UP) of Michigan supports numerous furbearer species, and the Department of Natural Resources is charged with managing the "Endangered" but rapidly recovering gray wolf (*Canis lupus*), the reintroduced fisher (*Martes pennanti*) and marten (*M. americana*), the Federally regulated bobcat (*Lynx rufus*) and river otter (*Lutra canadensis*), and a number of other furbearers of varying status. The diversity of life requisites and behaviors shown by furbearers in the UP complicates any effort to monitor their populations. Reliable and efficient methods to census these furbearers currently do not exist. Therefore, it is necessary to use one or more indices of abundance to monitor changes in the populations of each species of interest.

Harvest information and physical data have been collected as part of the registration process for fisher (Cooley et al. 2001a), bobcat (Cooley et al. 2001b), river otter (Cooley et al. 2001c), badger (*Taxidea taxus*, Karasek et al. 1996), and marten (Friedrich, unpubl. data). Mail surveys have been conducted periodically to estimate fur harvester effort and furbearer harvest by species. Results have been summarized most recently by Karasek (1998) and Frawley (2001a, 2001b). While these data are valuable as part of the mix of information available for managing furbearer populations, data from these surveys are affected by harvest related biases that can be independent of population status. The removal of the marten from the State list of "Threatened"

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mammals in 1999, provided additional impetus for developing an appropriate field survey technique. Registration information for the marten was limited to road kills and accidental and illegal catches prior to initiating a trapping season in 2000.

Furbearer Winter Track Count Surveys have been attempted in the UP since 1996, and formal summaries of the results of the surveys conducted from 1998 - 2000 have been reported by Earle (1999a, 1999b, and 2001, respectively). A winter track count approach was selected, because many of the species of greatest concern are active on the surface of the snow during winter, and suitable snow tracking conditions in the UP normally extend from late January until early April. The methods used in this experimental survey have been reexamined annually and revised to improve accuracy, precision, and efficiency. This survey continues to be developed, and when implemented fully, will permit data to be compared across multiple years. The objectives of this survey are to use a structured winter track count to determine the distribution and relative abundance of the marten in the UP, and to assess the potential of using this approach to monitor the status of several furbearers and selected prey species, simultaneously.

Methods

One hundred ninety-six survey routes were assigned to two Wildlife Management Units and the Research/Technology Section based on the amount of area to be surveyed and available personnel. Survey assistance was requested and received from the DNR Parks and Recreation Bureau and from the Eastern Unit of the Hiawatha National Forest. Additional assistance was offered by other agencies, but they were unable to complete any of their assigned routes. Each route was approximately 8.0 km in length, and separated from neighboring routes by distances of 4.0 to 8.0 km. Routes followed unpaved roads or trails with minimal right-of-way improvement. Survey participants selected the locations where routes would be placed based on prior anecdotal knowledge of marten populations, an evaluation of marten habitat suitability (Allen 1982 as amended by Earle 1997), availability of lightly traveled roads with minimal right-of-way improvements, access across private lands, minimal interference from active logging operations, and distance from the work station. The landscape ecology of the UP was considered when routes were located. Routes were placed entirely within ecological “Subsection” or “District” boundaries, identified by Albert (1995), in an effort to minimize variance within a surveyed route.

Track count routes were surveyed once between the “mid-winter thaw”, when the accumulated snow compacts (usually late January), and the end of winter (usually early April). Routes were traversed using snowmobiles or 4-WD vehicles. Route location, ambient weather conditions, tracking conditions, and time elapsed since the last marker snowfall were recorded. Each track crossing of a furbearer or selected prey was identified by location and species. The depth to which the animal sank in the snow was estimated, and the surrounding habitat was typed by visual estimation of species, size, and stocking of dominant tree species. Surrounding cover type information was collected at 15 randomly selected sites along each route applying the same species, size, and stocking criteria used at the locations of track crossings. Tracks of martens and fishers were separated by sex whenever they were distinct enough to measure the pronounced difference in size.

Winter track count results were summarized by species and analyzed by route. Differing times since the last marker snow and differing route distances were standardized by converting the data from frequency of track crossings per route to number of track crossings per 10 km, 24 hours after a marker snow ("Adjusted Track Crossings / 10 km"). Track count data from individual routes included high frequencies of "0" counts among less abundant species, low frequencies of very high counts among most species, and variable independence between individual track crossings for all species. These problems were addressed by using the Adjusted Track Crossings / 10 km measures to assign each route to an ordinal Abundance Class ("0,1,2,3, and 4" representing "0", "0.01-3.00", "3.01-9.00", "9.01-27.00", and "≥ 27.01", respectively). The resulting scores were compared by species, between segments / routes surveyed in both 2000 and 2001 using the Wilcoxon-Mann-Whitney test (Siegel and Castellan 1988). SPSS for Windows, Release 10.05 (SPSS, Inc., Chicago, IL 60606) was used for statistical analysis of all data. All tests were 2-tailed, and $P \leq 0.05$ was considered statistically significant.

Results and Discussion

Survey routes in previous years were broken into 4 segments, each a stretch of road or trail with minimum right-of-way improvement approximately 8 km (5 mi) in length, and separated by at least 4 km. They were to be surveyed in the same day, and the individual segment was the sampling unit from which data were analyzed. Cooperating survey personnel believed they could collect more data by having the opportunity to survey route segments independently, and not have to obligate an entire day to survey a 4-segment route. Therefore, survey routes were redefined in 2001 as a *single* stretch of road or trail with minimum right-of-way improvement, approximately 8 km in length. Most of the former route "segments" were designated as "routes", individual routes were surveyed as time and snow conditions permitted, and routes became the sampling unit from which data were analyzed.

Mild winter weather limited survey opportunities during February and March. Sixty-three of the 196 routes assigned were surveyed, and 61 of the 63 routes attempted were completed (Fig. 1). Comparing species abundance or habitat preferences between all 63 routes surveyed in 2001 and the 58 route segments surveyed in 2000 would not be valid, because only 50.8% of the route segments surveyed in 2000 were among the 63 routes surveyed in 2001. Therefore, data were compared between years for the 32 segments / routes surveyed during both years. Comparing a subset of routes between years reduces sample sizes, but comparing data from these routes would be more likely to detect changes if they exist.

Routes were surveyed 1-3 days after a marker snow. Data from 11 furbearers and 5 other species of interest were collected along the 504.7 km of roads and trails surveyed (Table 1). Marten tracks were found on 48% of the routes surveyed in 2001. Coyote (*Canis latrans*) was the most widely distributed furbearer, leaving tracks along 78% of the routes surveyed. Lagomorphs (snowshoe hare, *Lepus americanus* and cottontail rabbit, *Sylvilagus floridanus*) were almost as widely distributed, being detected along 75% of the routes surveyed.

Marten tracks were encountered along the 63 routes surveyed in 2001 at a time-adjusted rate of 1.64 crossings per 10 km surveyed (Table 1). Many of the marten track crossings were identified by sex, based on differences in track size. Application of marten home range size and spacing (Strickland et al. 1982, Katnik et al. 1994, Powell 1994, and Thomasma 1996) to the distribution of marten tracks along survey routes allowed a minimum population estimate to be determined. Interpretation of sex and spacing between track crossings suggests at least 53 martens left the 117 track crossings found during the survey in 2001.

Comparisons were made between 2001 and 2000 for the 32 routes /segments that were replicated. Marten tracks were encountered along these routes /segments at time-adjusted rates of 0.84 and 0.66 crossings per 10 km, respectively (Table 1). Statistical comparisons of Abundance Class scores between 2001 and 2000 for marten and 8 other species for which sufficient samples were recorded, did not show significant changes between years (Table 2). Abundance Class scores were scaled to require a widespread and consistent change in the number of time-adjusted track crossings per 10 km surveyed to show a statistically significant change between two years. Statistical analysis of changes in relative abundance among less common species can be masked by high frequencies of routes with "0" track crossings recorded. Routes with "0" counts include sampled areas where a species was present but did not happen to cross a road or trail during a given survey period, and routes where the species had yet to colonize or had chosen to abandon. Therefore, the Abundance Class scores of the same 9 species were compared between 2001 and 2000 for the replicated routes / segments that recorded at least one track crossing in *either* year. This permitted large, localized changes in abundance of a species to be detected. None of the species tested showed significant changes in Abundance Class scores. However, the 0.066 probability calculated for marten along routes where martens have been recorded previously, suggests the decline in Abundance Class from 2000 and 2001 may be a valid observation.

The gray wolf is the only species in this survey for which an independent annual estimate of population size exists. Intensive winter tracking of wolves throughout the mainland of the UP and Drummond Island generated estimates of 216 and 249 wolves during the winters of 1999 – 2000 and 2000 – 2001 respectively (Beyer, Hammill, Roell, and Lonsway, unpublished report). This was an increase of 15.3% between years. All measures of wolf abundance derived from the Furbearer Winter Track Count Survey increased from 2000 to 2001. Wolf tracks were found along a greater percentage of the 32 segments / routes replicated between years (25 and 34% for 2000 and 2001, respectively, Table 1). Wolf tracks were encountered at a higher adjusted rate (0.47 and 1.22 crossings per 10 km for 2000 and 2001, respectively). Both measures of wolf Mean Abundance Class increased from 2000 to 2001 (0.31 and 0.53 for segments / routes surveyed in both 2000 and 2001, respectively, and 0.67 and 1.13 for segments / routes with prior wolf activity, respectively, Table 2). A relatively small sample size and one route with 15 track crossings elevated most measures of wolf abundance above the 15.3 % increase estimated by the intensive winter tracking. Completion of more Furbearer Winter Track Count Survey routes should improve the correlation between these two survey techniques.

Interspecific comparisons of relative abundance are not valid, because differences in daily movements among diverse species can be profound. Species specific differences in seasonal habitat use can also affect the ability of a partially implemented survey to detect less common species. However, the complete absence of track crossings of three species highlights rarity (moose, *Alces alces*), or probable absence (lynx, *Lynx canadensis* and cougar, *Felis concolor*). No evidence of lynx or cougar has been found by this survey since its initiation in 1996, despite 1,726.9 km of survey route distance completed.

Cover types adjacent to 15 randomly selected points along each survey route were classified by species, size, and stocking. This provided a measure of habitat availability with which to compare the cover types adjacent to the sites where track crossings were observed. Habitat availability across the entire UP, habitat availability along the routes surveyed in 1998 and 2000, and the effect of stratification of survey route locations by the habitat preferences of marten have been reported in detail (Earle (1999, 2001). Winter habitat preferences of the marten and several other species or species groups surveyed in 1998 and 2000 have also been analyzed and reported (Earle 1999, 2001). Only minor differences existed between the two analyses. Therefore, further analysis of habitat variables collected during the Furbearer Winter Track Count Survey will be conducted when this survey becomes more fully implemented.

Summary

A furbearer winter track count survey was conducted in 2001 across the UP. The time and distance-adjusted frequencies of track crossings encountered were used to calculate relative abundance estimates for the marten and several other species of interest. No species showed a significant change in abundance between 2000 and 2001. The precision and accuracy of this measure of abundance will improve as sample sizes increase, and the sampling effort and area surveyed become more consistent among years. This will also permit a more quantitative analysis of survey results.

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Table 1. Relative abundance of track crossings recorded in 2001, and compared between routes surveyed in both 2001 and 2000.

	% of Routes Surveyed[a]			Track Crossings[b]			Adjusted Track X'ings / 10 km[c]		
Species	2001 Total	2001 Repl.[d]	2000 Repl.	2001 Total	2001 Repl.	2000 Repl.	2001 Total	2001 Repl.	2000 Repl.
Marten	48	31	47	117	29	31	1.64	0.84	0.66
Fisher	48	53	66	120	83	73	1.68	2.41	1.55
Mink	16	28	28	17	16	17	0.24	0.46	0.36
River Otter	13	19	13	10	8	6	0.14	0.23	0.13
R/G Fox	37	34	19	59	20	8	0.83	0.58	0.17
Coyote	78	81	81	218	128	140	3.06	3.72	2.97
Wolf	19	34	25	43	42	22	0.60	1.22	0.47
Bobcat	35	41	31	59	41	27	0.83	1.19	0.57
Lynx	0	0	0	0	0	0	0.00	0.00	0.00
Cougar	0	0	0	0	0	0	0.00	0.00	0.00
Raccoon	6	9	0	5	4	0	0.07	0.12	0.00
Black Bear	0	0	3	0	0	1	0.00	0.00	0.02
Hare, Rabbit	75	72	91	1199	526	406	16.83	15.28	8.61
Porcupine	8	13	9	6	5	5	0.08	0.15	0.11
Moose	0	0	0	0	0	0	0.00	0.00	0.00
R/S/S Grouse	37	34	25	105	32	33	1.47	0.93	0.70
Unk. Furbearer	8	13	6	5	4	4	0.07	0.12	0.08

[a] Sixty-three routes, 504.7 km in length, were surveyed in 2001. Thirty-two routes, 255.7 km in length, were replicated between 2000 and 2001.

[b] 2001 Total, N = 1,963; 2001 Repl, N = 938; 2000 Repl, N = 773.

[c] Adjusted to standardize track searching at 24 hours after a marker snow.

[d] Routes replicated by surveying in 2000 and 2001 (N = 32).

Table 2. Significance testing of relative abundance of track crossings between 32 routes surveyed in both 2001 and 2000, and routes showing activity by a given species in either survey year.

	Routes Replicated Between 2001 and 2000					Routes with Species Specific Activity in 2001 &/or 2000			
	Active Routes		Mean Abundance Class[a]			Active Routes	Mean Abundance Class[a]		
Species	2001	2000	2001	2000	P[b]	2001 &/or 2000	2001	2000	P[b]
Marten	10	15	0.38	0.56	0.179	18	0.67	1.00	0.066
Fisher	17	21	0.94	0.91	0.795	23	1.30	1.26	0.935
Mink	9	9	0.31	0.31	1.000	16	0.63	0.63	1.000
River Otter	6	4	-	-	c	8	-	-	c
R/G Fox	11	6	0.34	0.19	0.160	16	0.69	0.38	0.138
Coyote	26	26	1.38	1.22	0.480	32	1.38	1.22	0.480
Wolf	11	8	0.53	0.31	0.332	15	1.13	0.67	0.187
Bobcat	13	10	0.56	0.38	0.375	17	1.06	0.71	0.259
Lynx	0	0	-	-	c	0	-	-	c
Cougar	0	0	-	-	c	0	-	-	c
Raccoon	3	0	-	-	c	1	-	-	c
Black Bear	0	1	-	-	c	1	-	-	c
Hare, Rabbit	23	29	2.03	1.88	0.595	29	2.24	2.07	0.445
Porcupine	4	3	-	-	c	7	-	-	c
Moose	0	0	-	-	c	0	-	-	c
R/S/S Grouse	11	8	0.44	0.31	0.411	16	0.88	0.63	0.361
Unk. Furbearer	4	3	-	-	c	6	-	-	c

[a] Interval ordering of Adjusted Track Crossings / 10 km. Abundance classes of 0,1,2,3,and 4 correspond to 0.00, 0.01-3.00, 3.01-9.00, 9.01-27.00, and ≥ 27.01 Adjusted Track Crossings / 10 km, respectively.

[b] Significance level, Wilcoxon-Mann-Whitney test.

[c] Sample size was insufficient for testing.

Fig. 1. Marten activity along survey routes in 2001. Shaded route symbols identify routes surveyed in 2000 and 2001.